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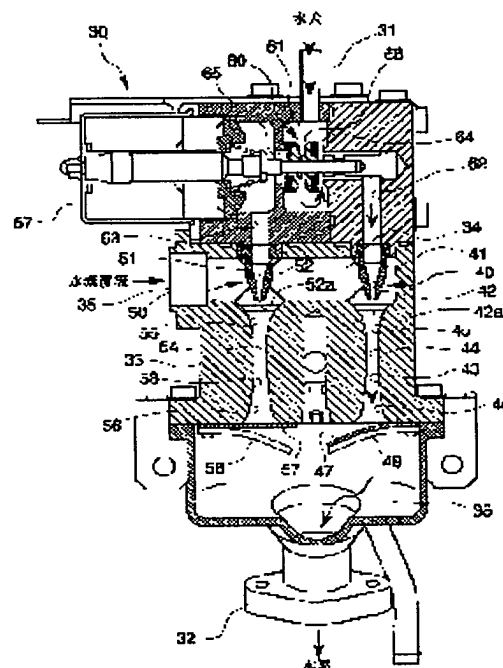
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(54) FLUID SUPPLY DEVICE FOR FUEL CELL

(57)Abstract:

PROBLEM TO BE SOLVED: To secure the predetermined stoichiometric characteristic over a wide range from a small flow to a large flow, and to secure the required flow of the fuel.

SOLUTION: A unit main body 33 is provided with a first ejector 40, a second ejector 50 and a selector valve inside thereof. The selector valve 60 has a function of selecting any one of a first passage 62 and a second passage 63 to allow it to communicate with a valve chamber 61 and to shut the other. The first passage 62 is communicated with a nozzle 41 of the first ejector 40, and the second passage 63 is communicated with a nozzle 51 of the second ejector 50. The first ejector 40 has a diffuser passage 43 communicated with a return flow chamber 34, and the second ejector 50 has a diffuser passage 53 communicated with the return flow chamber 34. The diffuser passage 43 and the diffuser passage 53 are connected to a hydrogen outlet tube 32 through a joining passage 36.



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CLAIMS

[Claim(s)]

[Claim 1] One diffuser which attracts the 2nd fluid, is made to join said 1st fluid, and is sent out with the negative pressure which it is prepared in the direction of an axis of one nozzle which injects the 1st fluid, and this nozzle, and is generated by injection of said 1st fluid, It has the ejector change means formed switchable. ***** -- an ejector -- two or more preparations -- further -- the passage to the nozzle of two or more of said ejectors -- any one -- selection -- The fluid feeder of the fuel cell characterized by having the case which contains two or more of said ejectors and said ejector change means.

[Claim 2] It is the fluid feeder of the fuel cell according to claim 1 which the 1st fluid channel to which the 1st fluid except the nozzle of two or more of said ejectors being supplied can circulate is established in said case, and is characterized by said two or more ejectors sending out a fluid to said 1st fluid channel.

[Claim 3] The fluid feeder of the fuel cell according to claim 1 or 2 characterized by having the control section which controls said ejector change means according to the input signal about a demand flow rate.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the fluid feeder used for supply systems, such as a fuel of a fuel cell.

[0002]

[Description of the Prior Art] As opposed to the cell which the solid-state macromolecule membrane type fuel cell put the solid-state polyelectrolyte film from both sides with the anode and the cathode conventionally, and was formed It has the stack (it is called a fuel cell to below) constituted by carrying out the laminating of two or more cells. Hydrogen is supplied to an anode as a fuel, air is supplied to a cathode as an oxidizer, the hydrogen ion generated by catalytic reaction in the anode passes the solid-state polyelectrolyte film, and moves even a cathode, and with a cathode, oxygen and electrochemical reaction are caused and it generates electricity.

[0003] Here, in order to maintain the ion conductivity of a solid-state molecule electrolyte membrane, superfluous water is mixed with humidification equipment etc. by the hydrogen supplied to a fuel cell. For this reason, water collects on the gas passageway in the electrode of a fuel cell, and the predetermined blowdown flow rate is set to the blowdown fuel so that this gas passageway may not be closed.

[0004] Under the present circumstances, by mixing and carrying out the recirculation of the blowdown fuel (it being hereafter called hydrogen backflow) to the fuel (namely, hydrogen) newly introduced into a fuel cell, a fuel can be utilized effectively and the energy efficiency of a solid-state macromolecule membrane type fuel cell can be raised. Conventionally, the fuel cell equipment to which the recirculation of the fuel is carried out with an ejector is known like the fuel cell equipment indicated by JP,9-213353,A as fuel cell equipment which was mentioned above.

[0005] If an ejector is explained here, the conventional common ejector projects the nozzle 4 which formed the ** style rooms 2 successively to end face opening of the diffuser 1 which makes the shape of a trumpet, opened the ** style path 3 for free passage in this ** style room 2, made the diffuser 1 and the axis the same and has arranged them as shown in drawing 7 in the ** style room 2, and makes end face opening of a diffuser 1 face that head, and it is constituted. If the hydrogen newly introduced into a fuel cell in this ejector is turned to a diffuser 1 and injected from a nozzle 4, negative pressure will occur in the throat section 5 of a diffuser 1, and the hydrogen backflow introduced into the ** style room 2 by this negative pressure is attracted in a diffuser 1, and the hydrogen and hydrogen backflow which were injected from the nozzle 4 will be mixed, and it will be sent out from the outlet of a diffuser 1.

[0006] SUTOIKI is in the index which shows the attraction effectiveness of this ejector. Here, if it says in said example, it will be defined as SUTOIKI as a ratio (Q_t/Q_a) of the hydrogen flow rate (namely, hydrogen supply full flow supplied to a fuel cell) Q_t which flows out of the diffuser to the hydrogen flow rate (namely, hydrogen consumption flow rate) Q_a spouted from a nozzle. Moreover, if the hydrogen backflow flow rate attracted by the diffuser from a ** style room is set to Q_b , since it is $Q_t=Q_a+Q_b$, SUTOIKI will be defined as $(Q_a+Q_b)/Q_a$. Thus, if SUTOIKI is defined, it can be said that attraction effectiveness is large, so that a SUTOIKI value is large.

[0007] By the way, since the diameter of a diffuser and the diameter of a nozzle are being fixed in one ejector in the conventional ejector, it is common to select and use the optimal path respectively at operating fluid-flow within the limits. In this case, the fluid flow rate (if it says in said example, it will be hydrogen consumption flow Q_a) from which the SUTOIKI value of an ejector becomes max is determined as a fixed value. A SUTOIKI value becomes small although hydrogen consumption flow Q_a will become large, if hydrogen consumption flow Q_a decreases and the diameter of a nozzle becomes large on the other hand,

although a SUTOIKI value will rise if drawing 8 shows an example of the experimental result which asked the relation (henceforth a SUTOIKI property) between a SUTOIKI value and hydrogen consumption flow Q_a for the diameter of a nozzle as a parameter in the ejector for fuel supply of a fuel cell and the diameter of a nozzle becomes small.

[0008] Here, in the case of the fuel cell, since a hydrogen flow rate changed also ten to 20 times from an idling to output at full gate opening in being a fuel cell powered vehicle after the SUTOIKI value (henceforth a demand SUTOIKI value) demanded according to the operational status of a fuel cell is decided as a thick continuous line shows drawing 8, it was difficult [it] to continue throughout a hydrogen flow rate with one ejector, and to satisfy a demand SUTOIKI value.

[0009]

[Problem(s) to be Solved by the Invention] In order to avoid this problem, it has an ejector for small flow rates, and an ejector for large flow rates, and the fluid channel to the ejector for small flow rates is made normally open, and the ejector structure as for which it was made for the solenoid valve which it is made to operate, and always formed the ejector for small flow rates in the fluid channel to the ejector for large flow rates only with the ejector for small flow rates when a flow rate was insufficient to operate both an aperture, the ejector for small flow rates, and the ejector for large flow rates can be considered.

[0010] However, since the sum of the opening area of the diffuser of both ejectors becomes large too much and the balance of the optimum value of a nozzle and a diffuser collapses to the fluid flow injected from the nozzle of both ejectors when it does in this way, and the fluid channel to the ejector for large flow rates becomes open, the nonconformity that the SUTOIKI engine performance at the time of a large flow rate is not securable arises. Then, this invention offers the fluid feeder of the fuel cell which can secure the predetermined SUTOIKI engine performance in a wide range flow rate region.

[0011]

[Means for Solving the Problem] The fuel cell built over invention indicated to claim 1 in order to solve the above-mentioned technical problem The fluid feeder (for example, ejector unit 30 in the gestalt of operation) of (the fuel cell [for example,] 11 in the gestalt of operation mentioned later) One nozzle which injects the 1st fluid (for example, hydrogen in the gestalt of operation mentioned later) (for example, the nozzle 41 or nozzle 51 in a gestalt of the operation mentioned later), With the negative pressure which it is prepared in the direction of an axis of this nozzle, and is generated by injection of said 1st fluid, the 2nd fluid One diffuser which attracts (for example, the hydrogen backflow in the gestalt of operation mentioned later), is made to join said 1st fluid, and is sent out (for example, the diffuser path 43 or the diffuser path 53 in a gestalt of the operation mentioned later), ***** -- an ejector (for example, the 1st ejector 40 or the 2nd ejector 50 in a gestalt of the operation mentioned later) -- two or more preparations -- further -- the passage to the nozzle of two or more of said ejectors -- any one -- selection -- it formed switchable -- an ejector change means It has (for example, the change valve 60 in the gestalt of operation mentioned later), and is characterized by having the case (for example, body 33 of a unit in the gestalt of operation mentioned later) which contains two or more of said ejectors and said ejector change means.

[0012] Thus, with constituting, a SUTOIKI property is changeable according to the consumption of a fuel by being able to operate any one ejector independently with an ejector change means, therefore differing in the diameter of a nozzle, and the diameter of a diffuser for every ejector. Here, SUTOIKI means the ratio of the sum (namely, full flow) of the 1st fluid to the 1st fluid flow, and the 2nd fluid flow. Moreover, since two or more ejectors and ejector change means are built in in a case, a fuel supply system can be miniaturized.

[0013] The 1st fluid channel (for example, the unification path 36 and the bypass hydrogen inlet port 37 in a gestalt of the operation mentioned later) to which the 1st fluid except invention indicated to claim 2 being supplied to the nozzle of two or more of said ejectors in the fluid feeder of said fuel cell according to claim 1 can circulate be established in said case, and be characterized by said two or more ejectors sending out a fluid to said 1st fluid channel. Thus, with constituting, after making the 1st fluid sent out from an ejector, and the 1st fluid except an ejector being supplied join by the 1st fluid channel, it can send out down-stream.

[0014] Invention indicated to claim 3 is characterized by having the control section (for example, ECU in the gestalt of operation mentioned later) which controls said ejector change means according to the input signal (for example, output current of the fuel cell in the gestalt of operation mentioned later) about a demand flow rate in the fluid feeder of said fuel cell according to claim 1 or 2. thus, the ejector according to a demand flow rate in constituting -- proper -- choosing -- **** of operation -- things are made.

[0015]

[Embodiment of the Invention] Hereafter, the gestalt of operation of the fluid feeder of the fuel cell concerning this invention is explained with reference to the drawing of drawing 6 from drawing 1.

Introduction and the gestalt of implementation of the 1st of this invention are explained with reference to the drawing of drawing 5 from drawing 1. Drawing 1 is system configuration drawing of the fuel-supply system of the fuel cell equipped with the fluid feeder concerning this invention. The fuel-supply system of this fuel cell is carried in cars, such as an electric vehicle, is equipped with a fuel cell 11, the humidification section 13, the oxidizer feed zone 14, the heat exchange section 15, the water separation section 16, the ejector unit (fluid feeder) 30, the fuel-supply lateral pressure control section 18, and the bypass lateral pressure control section 19, and is constituted.

[0016] The fuel cell 11 consisted of a stack constituted by carrying out the laminating of two or more cells to the cell which put the solid-state polyelectrolyte film which consists for example, of solid-state polymer ion exchange membrane etc. from both sides with the anode and the cathode, and was formed, and is equipped with the fuel electrode with which hydrogen is supplied as a fuel, and the air pole to which the air which contains oxygen as an oxidizer is supplied.

[0017] Air exhaust port 20b in which the air exhaust valve 21 for discharging outside air supply opening 20a to which air is supplied from the oxidizer feed zone 14, the air in an air pole, etc. was formed is prepared in the air pole. On the other hand, 20d of fuel exhaust ports for discharging outside fuel-supply opening 20c to which hydrogen is supplied, the hydrogen in a fuel electrode, etc. is prepared in the fuel electrode.

[0018] The hydrogen as a fuel is supplied to the fuel electrode of a fuel cell 11 from fuel-supply opening 20c through the fuel-supply lateral pressure control section 18, the ejector unit 30, and the humidification section 13. After the humidification section 13 mixed the steam in the hydrogen supplied and humidified hydrogen, it was supplied to the fuel cell 11, and it has secured the ion conductivity of a solid-state molecule electrolyte membrane. The ejector unit 30 is formed in the passage which connects the fuel-supply lateral pressure control section 18 and the humidification section 13. Although the configuration of the ejector unit 30 is explained in full detail later, as shown in drawing 3 from drawing 1, the fuel-supply lateral pressure control section 18 is connected to the hydrogen inlet pipe 31 of the ejector unit 30, and the humidification section 13 is connected to the hydrogen outlet pipe 32 of the ejector unit 30. And the blowdown fuel discharged from 20d of fuel exhaust ports of a fuel cell 11 is removed in moisture in the water separation section 16, and is supplied to the hydrogen backflow inlet port 35 of the ejector unit 30 through a check valve 23. The ejector unit 30 mixes the fuel supplied from the fuel-supply lateral pressure control section 18, and the blowdown fuel discharged from the fuel cell 11, and supplies it to a fuel cell 11.

[0019] Moreover, the bypass path 22 which bypasses the ejector unit 30 is established in the passage which connects the fuel-supply lateral pressure control section 18 and the humidification section 13, and the bypass lateral pressure control section 19 is formed in this bypass path 22.

[0020] It supplies air to the fuel-supply lateral pressure control section 18 and the bypass lateral pressure control section 19 while the oxidizer feed zone 14 consists of an air compressor, is controlled according to the input signal from the load and accelerator pedal (not shown) of a fuel cell 11 etc. and supplies air to the air pole of a fuel cell 11 through the heat exchange section 15. The heat exchange section 15 warms the air from the oxidizer feed zone 14 to predetermined temperature, and supplies it to the fuel cell 11.

[0021] The fuel-supply lateral pressure control section 18 and the bypass lateral pressure control section 19 consisted of a proportion pressure control valve of for example, an air type, made signal pressure the pressure of the air supplied from the oxidizer feed zone 14, and the fuel which passed each pressure-control sections 18 and 19 has set the pressure which it has at the outlet of each pressure-control sections 18 and 19, i.e., a supply pressure, as a predetermined value. For example, in the fuel-supply lateral pressure control section 18, it is set as signal pressure:supply-pressure = 1:3, and is set as signal pressure:supply-pressure = 1:1 in the bypass lateral pressure control section 19.

[0022] Next, the ejector unit 30 is explained with reference to drawing 2 and drawing 3. It has the body 33 of a unit equipped with the hydrogen inlet pipe 31 to which the ejector unit 30 is connected to the fuel-supply lateral pressure control section 18, and hydrogen is supplied, and the hydrogen outlet pipe 32 which sends out hydrogen to the humidification section 13 (case). Inside this body 33 of a unit, the change valve (ejector change means) 60 which changes selectively whether hydrogen is supplied is built in the 1st ejector 40, the 2nd ejector 50, and which ejector of these ejectors 40 and 50, and it is constituted.

[0023] The 1st path 62 and the 2nd path 63 which stand in a row in the valve chest 61 which is open for free passage to the hydrogen inlet pipe 31, and the valve chest 61 are established in the body 33 of a unit. Moreover, the 1st annular valve seat 64 is formed in the free passage section which opens the valve chest 61 and the 1st path 62 for free passage, and the 2nd annular valve seat 65 is formed in the free passage section which opens the valve chest 61 and the 2nd path 63 for free passage. The 1st valve seat 64 and the 2nd valve seat 65 counter mutually, and are arranged, and the valve element 66 is arranged among both the valve seats

64 and 65. the electromagnetism by which the valve element 66 was fixed to the body 33 of a unit -- it supports movable with an actuator 67 -- having -- **** -- the 1st valve seat 64 and the 2nd valve seat 65 -- receiving -- taking a seat -- alienation has become possible. The 1st path 62 is connected to the nozzle 41 of the 1st ejector 40, and the 2nd path 63 is connected to the nozzle 51 of the 2nd ejector 50.

[0024] here -- the valve chest 61, the 1st path 62, the 2nd path 63, the 1st valve seat 64, the 2nd valve seat 65, a valve element 66, and electromagnetism -- an actuator 67 constitutes the change valve 60 and ON/OFF control of the change valve 60 is carried out by the Chuo Electronics control unit (it abbreviates to ECU hereafter) which is not illustrated. A valve element 66 sits down to the 2nd valve seat 65 in the state of OFF, and he is trying, as for the change valve 60, for a valve element 66 to sit down to the 1st valve seat 64 in the state of ON. And if a valve element 66 sits down to the 2nd valve seat 65, since the valve chest 61 and the 1st path 62 will be open for free passage and the valve chest 61 and the 2nd path 63 will be intercepted, the whole quantity comes to flow to the 1st path 62, and the hydrogen supplied to the valve chest 61 from the hydrogen inlet pipe 31 does not flow to the 2nd path 63. On the other hand, if a valve element 66 sits down to the 1st valve seat 64, since the valve chest 61 and the 2nd path 63 will be open for free passage and the valve chest 61 and the 1st path 62 will be intercepted, the whole quantity comes to flow to the 2nd path 63, and the hydrogen supplied to the valve chest 61 from the hydrogen inlet pipe 31 does not flow to the 1st path 62.

[0025] Moreover, the ** style room 34 is established in the body 33 of a unit, and this ** style room 34 is connected to the hydrogen backflow inlet port 35 which carries out opening by the appearance of the body 33 of a unit. As the nozzle 41 of the 1st ejector 40 and the nozzle 51 of the 2nd ejector 50 make each point project in the ** style room 34, they are being fixed to the body 33 of a unit, and both the nozzles 41 and 51 make an axis parallel mutually, and are arranged. Nozzles 41 and 51 have the fluid channels 42 and 52 penetrated in the direction of an axis, respectively, the diameter of them is gradually reduced as fluid channels 42 and 52 progress at a head (lower stream of a river), and they stand in a row in the openings 42a and 52a at a head.

[0026] Moreover, two diffuser paths (diffuser) 43 and 53 which stand in a row in the ** style room 34 are established in the body 33 of a unit. The diffuser path 43 makes a nozzle 41 and an axis the same, and is established in the downstream of a nozzle 41, and the diffuser path 53 makes a nozzle 51 and an axis the same, and is established in the downstream of a nozzle 51. The diffuser path 43 has the throat section 44 from which a bore becomes the middle with min. The converging section 45 whose diameter is gradually reduced continuously as it progresses in the direction of a lower stream of a river rather than this throat section 44 at the upstream (it sets to drawing 2 and drawing 3 , and is the upper part) is formed. The diameter expansion section 46 whose diameter is expanded continuously gradually is formed as it progresses in the direction of a lower stream of a river rather than the throat section 44 at the downstream (it sets to drawing 2 and drawing 3 , and is a lower part). The breadth include angle of the diameter expansion section 46 is smaller than the breadth include angle of a converging section 45. It has the throat section 54, a converging section 55, and the diameter expansion section 56 like [the diffuser path 53] the diffuser path 43.

[0027] It connects with the unification path 36 and each diffuser paths 43 and 53 are opening the unification path 36 for free passage to the hydrogen outlet pipe 32. And the outlet of each diffuser paths 43 and 53 is equipped with the lead valves 47 and 57 and stoppers 48 and 58 for antisuckbacks, respectively, in case a fluid circulates the diffuser path 43, a lead valve 57 closes and the diffuser path 53 is blockaded, and in case a fluid circulates the diffuser path 53, it is constituted so that a lead valve 47 may close and the diffuser path 43 may be blockaded. Thus, by constituting, the fluid which passed through the diffuser path 43 flows backwards from the unification path 36 to the diffuser path 53, the same fluid circulates between the diffuser path 43 and 53, and it can prevent that the substantial amount of hydrogen backflow decreases (that is, SUTOIKI falls).

[0028] If a nozzle 41, the diffuser path 43, and the ** style room 34 constitute the 1st ejector 40 and hydrogen is injected towards the diffuser path 43 here from opening 42a of a nozzle 41 Negative pressure occurs near the throat section 44 of the diffuser path 43, and the hydrogen backflow in the ** style room 34 is absorbed by this negative pressure at the diffuser path 43. The hydrogen injected from the nozzle 41 and the hydrogen backflow absorbed from the ** style room 34 will be mixed at the diffuser path 43.

[0029] Moreover, if a nozzle 51, the diffuser path 53, and the ** style room 34 constitute the 2nd ejector 50 and hydrogen is injected towards the diffuser path 53 from opening 52a of a nozzle 51 Negative pressure occurs near the throat section 54 of the diffuser path 53, and the hydrogen backflow in the ** style room 34 is absorbed by this negative pressure at the diffuser path 53. The hydrogen injected from the nozzle 51 and

the hydrogen backflow absorbed from the ** style room 34 will be mixed at the diffuser path 53.

[0030] The bore of the nozzle 41 of the 1st ejector 40, and the bore of the diffuser path 43 in addition, respectively It is set up smaller than the bore of the nozzle 51 of the 2nd ejector 50, and the bore of the diffuser path 53. The 1st ejector 40 It functions as an ejector for small flow rates which satisfies a need SUTOIKI value at the time of a small flow rate, and the 2nd ejector 50 is set up so that it may function as an ejector for large flow rates which satisfies a need SUTOIKI value at the time of a large flow rate. For example, the bore of the throat section 44 of 1.0mm and the diffuser path 43 is set to 4.0mm for the bore of opening 42a of a nozzle 41, and the bore of the throat section 54 of 1.5mm and the diffuser path 53 is set as 4.5mm for the bore of opening 52a of a nozzle 51.

[0031] Next, an operation of this ejector unit 30 is explained. The change valve 60 of the ejector unit 30 is controlled based on the output current of a fuel cell 11, when the output current of a fuel cell 11 is smaller than a predetermined value, a valve 60 is controlled by the OFF condition by changing, and when the output current of a fuel cell 11 is beyond a predetermined value, the change valve 60 is controlled by ON condition.

[0032] Since a valve element 66 will sit down to the 2nd valve seat 65 as shown in drawing 2 if the change valve 60 is changed into an OFF condition, the hydrogen supplied to the valve chest 61 from the hydrogen inlet pipe 31 flows to the fluid channel 42 of a nozzle 41 through the 1st path 62, and is injected toward the diffuser path 43 from opening 42a of a nozzle 41. Then, the hydrogen backflow supplied to the ** style room 34 from the hydrogen backflow inlet port 35 is absorbed in the diffuser path 43 by the negative pressure generated near the throat section 44 of the diffuser path 43. Consequently, it is mixed at the diffuser path 43 and the hydrogen injected from the nozzle 41 and the hydrogen backflow absorbed from the ** style room 34 are sent out to the unification path 36 through a lead valve 47. And it passes along the hydrogen outlet pipe 32 from the unification path 36, and a fuel cell 11 is supplied through a humidifier 13. In addition, at this time, since the valve chest 61 and the 2nd path 63 are intercepted by the valve element 66, the hydrogen of the valve chest 61 does not flow to the 2nd path 63, therefore hydrogen is not injected from opening 52a of a nozzle 51.

[0033] That is, the output current of a fuel cell 11 is smaller than a predetermined value, when there is little hydrogen consumption, as for this ejector unit 30, only the 1st ejector 40 will function, and the 2nd ejector 50 will not function. And according to the 1st ejector 40, in a small flow rate, a predetermined SUTOIKI value [a little] higher than a demand SUTOIKI value can be acquired. In addition, since the lead valve 57 is formed in the lower stream of a river of the diffuser path 53, when the change valve 60 is in an OFF condition, hydrogen does not flow backwards from the unification path 36 to the diffuser path 53. Moreover, since the pressure in the ** style room 34 is lower than the pressure in the unification path 36, the hydrogen backflow in the ** style room 34 does not flow into the unification path 36 through the diffuser path 53.

[0034] On the other hand, since a valve element 66 will sit down to the 1st valve seat 64 as shown in drawing 3 if the change valve 60 is changed into ON condition, the hydrogen supplied to the valve chest 61 from the hydrogen inlet pipe 31 flows to the fluid channel 52 of a nozzle 51 through the 2nd path 63, and is injected toward the diffuser path 53 from opening 52a of a nozzle 51. Then, the hydrogen backflow of the ** style room 34 is absorbed in the diffuser path 53 by the negative pressure generated near the throat section 54 of the diffuser path 53. Consequently, it is mixed at the diffuser path 53 and the hydrogen injected from the nozzle 51 and the hydrogen backflow absorbed from the ** style room 34 are sent out to the unification path 36 through a lead valve 57. And it passes along the hydrogen outlet pipe 32 from the unification path 36, and a fuel cell 11 is supplied through a humidifier 13. In addition, at this time, since the valve chest 61 and the 1st path 62 are intercepted by the valve element 66, the hydrogen of the valve chest 61 does not flow to the 1st path 62, therefore hydrogen is not injected from opening 42a of a nozzle 41.

[0035] That is, the output current of a fuel cell 11 becomes beyond a predetermined value, when hydrogen consumption is large, as for this ejector unit 30, only the 2nd ejector 50 will function, and the 1st ejector 40 will not function. And according to the 2nd ejector 50, in a large flow rate, a predetermined SUTOIKI value [a little] higher than a demand SUTOIKI value can be acquired. In addition, since the lead valve 47 is formed in the lower stream of a river of the diffuser path 43, when the change valve 60 is in ON condition, hydrogen does not flow backwards from the unification path 36 to the diffuser path 43. Moreover, since the pressure in the ** style room 34 is lower than the pressure in the unification path 36, the hydrogen backflow in the ** style room 34 does not flow into the unification path 36 through the diffuser path 43.

[0036] Drawing 4 is the flow chart of ejector change control. First, ECU acts as the monitor of the output current of a fuel cell 11 in step S101, next it progresses to step S102, and the output current judges whether it is beyond a predetermined value. When a negative judging is carried out at step S102, it changes to step

S103 spontaneously, and a valve 60 is changed into an OFF condition. Then, an aperture and the 2nd path 63 (namely, large flow rate side path) are shut for the 1st path 62 (namely, small flow rate side path) at step S104. Consequently, the ejector unit 30 will function as an ejector for small flow rates. On the other hand, when an affirmation judging is carried out at step S102, it changes to step S105 spontaneously, and a valve 60 is changed into ON condition. Then, an aperture and the 1st path 62 (namely, small flow rate side path) are shut for the 2nd path 63 (namely, large flow rate side path) at step S106. Consequently, the ejector unit 30 will function as an ejector for large flow rates.

[0037] Next, an operation of the fuel-supply system of the fuel cell in the gestalt of this operation is explained. First, the air of the proper pressure (signal pressure P_t) set up, for example according to the load of a fuel cell 11, the control input of an accelerator pedal, etc. is supplied to the air pole, the fuel-supply lateral pressure control section 18, and the bypass lateral pressure control section 19 of a fuel cell 11 from the oxidizer feed zone 14. Then, the fuel-supply lateral pressure control section 18 supplies hydrogen towards the hydrogen inlet pipe 31 and the bypass path 22 of the ejector unit 30, 3 times, i.e., supply-pressure $P_{se}=3P_t$, of signal pressure P_t . On the other hand, the bypass lateral pressure control section 19 of the bypass path 22 is set up so that hydrogen may be supplied by supply-pressure $P_{sb}=P_t$ of signal pressure P_t and this **, therefore this supply pressure P_{sb} is set below to the supply pressure P_{se} of the hydrogen supplied from the fuel-supply lateral pressure control section 18.

[0038] Here, the output current of a fuel cell 11 is smaller than a predetermined value, and since it changes as mentioned above, and a valve 60 is controlled by the condition with few flow rates of the hydrogen supplied to a fuel electrode by the OFF condition, the hydrogen supplied from the fuel-supply lateral pressure control section 18 is supplied to the 1st ejector 40 through the change valve 60. And when the fuel flow supplied to a fuel cell 11 in this condition is very small, the pressure loss in a nozzle 41 is small, and the outlet pressure of the hydrogen in the outlet of the diffuser path 43 of the 1st ejector 40 is larger than the supply pressure P_{se} of the hydrogen supplied from the fuel-supply lateral pressure control section 18, and the supply pressure P_{sb} of the hydrogen set up by the bypass lateral pressure control section 19 practically equal. For this reason, the bypass lateral pressure control section 19 is not opened, but the flow rate of the hydrogen supplied to a fuel cell 11 from the bypass path 22 is zero, and a SUTOIKI value is determined by the SUTOIKI property of the 1st ejector 40.

[0039] And it follows on the flow rate of the hydrogen which passes the nozzle 41 of the 1st ejector 40 increasing. If the pressure loss of the hydrogen in the nozzle 41 of the 1st ejector 40 increases and the outlet pressure of the hydrogen in the outlet of the diffuser path 43 of the 1st ejector 40 turns into below the supply pressure P_{sb} set up by the bypass lateral pressure control section 19 The bypass lateral pressure control section 19 is opened, the flow rate of the hydrogen supplied to a fuel cell 11 from the bypass path 22 increases gradually, and hydrogen comes to be supplied to a fuel cell 11 also from the bypass path 22.

[0040] Furthermore, the hydrogen supplied from the fuel-supply lateral pressure control section 18 since it changes as it mentioned above, when the amount of the hydrogen consumed with a fuel cell 11 increased and the output current of a fuel cell 11 became beyond said predetermined value, and a valve 60 changes to ON condition from an OFF condition and it is controlled is supplied to the 2nd ejector 50 through the change valve 60.

[0041] and after the change of the change valve 60, the pressure loss in a nozzle 51 is alike and small, and the outlet pressure of the hydrogen in the outlet of the diffuser path 53 of the 2nd ejector 50 has the hydrogen amount of supply larger than the supply pressure P_{sb} of the hydrogen set up by the bypass lateral pressure control section 19 to a fuel cell 11 in an inside flow rate region. For this reason, the bypass lateral pressure control section 19 is not opened, but the flow rate of the hydrogen supplied to a fuel cell 11 from the bypass path 22 is zero, and a SUTOIKI value is determined by the SUTOIKI property of the 2nd ejector 50.

[0042] And it follows on the flow rate of the hydrogen which passes the nozzle 51 of the 2nd ejector 50 increasing. If the pressure loss of the hydrogen in the nozzle 51 of the 2nd ejector 50 increases and the outlet pressure of the hydrogen in the outlet of the diffuser path 53 of the 2nd ejector 50 turns into below the supply pressure P_{sb} set up by the bypass lateral pressure control section 19 The bypass lateral pressure control section 19 is opened, the flow rate of the hydrogen supplied to a fuel cell 11 from the bypass path 22 increases gradually, and hydrogen comes to be supplied to a fuel cell 11 also from the bypass path 22. Therefore, in the independent activity of the 2nd ejector 50, the hydrogen of the part running short can be supplied to a fuel cell 11 through the bypass path 22, and it can respond at the time of a large flow rate.

[0043] Drawing 5 is SUTOIKI property drawing of the fuel-supply system in the gestalt of this operation, and can check the thing which cover a large flow rate from a small flow rate and for which a bigger

SUTOIKI value than a need SUTOIKI value can be mostly acquired in a full flow area. In addition, in drawing 5, the broken line shows the time of the fuel being filled up from the bypass path 22.

[0044] Thus, according to the fuel-supply system of the fuel cell equipped with the ejector unit 30 in the gestalt of this operation, by the change of the change valve 60, the 1st ejector 40 or the 2nd ejector 50 can be operated, and the recirculation of the hydrogen backflow can be carried out to a fuel cell 11. And it can send out a required fuel flow to a fuel cell 11, the 1st ejector 40 covering a large area from the small flow rate at the time of an idle to a large flow rate, and securing a predetermined SUTOIKI property, since it has a SUTOIKI property as an ejector for small flow rates and the 2nd ejector 50 has the SUTOIKI property as an ejector for large flow rates.

[0045] Moreover, since it changes to the two ejectors 40 and 50 and the valve 60 is built in in the body 33 of a unit, a fuel-supply system can be miniaturized. Furthermore, since it changes according to the output current of a fuel cell 11 and he is trying to change a valve 60, selection of an ejector is performed proper and the hydrogen flow rate (demand flow rate) needed with a fuel cell 11 can certainly be sent out. In addition, although the actual output current of a fuel cell 11 was used with the gestalt of this operation as an input signal about the hydrogen flow rate to demand, a target current, measurement / target hydrogen flow rate, etc. may be used for others.

[0046] Next, the gestalt of the 2nd operation in the fluid feeder of the fuel cell concerning this invention is explained with reference to drawing 6. Drawing 6 is the sectional view of the ejector unit 30 in the gestalt of the 2nd operation. The point that the gestalt of the 2nd operation is different from the gestalt of the 1st operation is only a point which equipped the body 33 of a unit with the bypass hydrogen inlet port. That is, with the gestalt of this 2nd operation, the hydrogen outlet pipe 32 is formed in the end of the unification path 36 of the body 33 of a unit, the bypass hydrogen inlet port 37 is established in the other end of the unification path 36, and the down-stream edge of the bypass path 22 is connected to this bypass hydrogen inlet port 37.

[0047] Thus, in addition to an operation of the ejector unit 30 of the gestalt of the 1st operation mentioned above, there is the next operation in the constituted ejector unit 30. That is, after fully mixing beforehand the hydrogen sent out from the 1st ejector 40 or the 2nd ejector 50, and the hydrogen supplied from the bypass path 22 at the unification path 36 within the body 33 of a unit, a fuel cell 11 can be supplied. And since unitization can be carried out including the unification part of this hydrogen, there is also an advantage which can constitute a fuel-supply system in a compact. Since it is the same as the thing of the gestalt of the 1st operation about other configurations, the same sign is given to the same mode part, and explanation is omitted.

[0048] In addition, although the bypass path 22 and the bypass lateral pressure control section 19 were formed with the gestalt of the 1st operation mentioned above, and the gestalt of the 2nd operation, there may be these [no]. Moreover, the number of the ejectors built in the body 33 of a unit may not be restricted to two, and may be three or more than it. In that case, it is necessary to constitute an ejector change means so that each ejector can be operated independently.

[0049]

[Effect of the Invention] As explained above, according to the fuel supply system of a fuel cell according to claim 1 Since flow characteristics are changeable by being able to operate any one ejector independently with an ejector change means, therefore differing in the diameter of a nozzle, and the diameter of a diffuser for every ejector A required fuel flow can be sent out to a fuel cell, covering a large area from the small flow rate at the time of an idle to a large flow rate, and securing a predetermined SUTOIKI property. And since two or more ejectors and ejector change means are built in in a case, a fuel supply system can be miniaturized.

[0050] Moreover, since according to the fuel supply system of a fuel cell according to claim 2 it can send out down-stream after making the 1st fluid sent out from an ejector, and the 1st fluid except an ejector being supplied join by the 1st fluid channel in addition to said effectiveness, the hydrogen flow rate of the part which run short when passing an ejector can be filled up, and the hydrogen of a large flow rate can be sent out to a fuel cell. Moreover, the fuel supply system equipped with the bypass path can be miniaturized. furthermore, the ejector corresponding to the demand flow rate according to the fuel supply system of a fuel cell according to claim 3 -- proper -- choosing -- **** of operation -- since things are made, the fuel of a flow demand can be supplied to a fuel cell with the optimal SUTOIKI value.

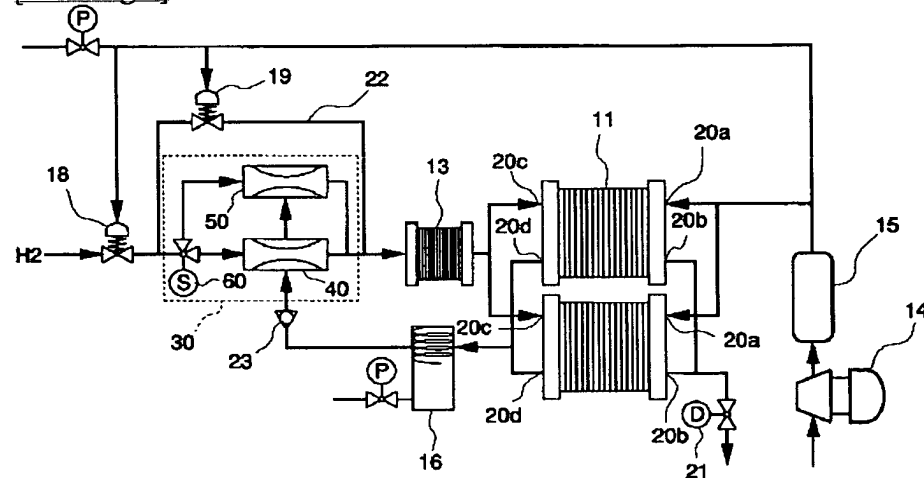
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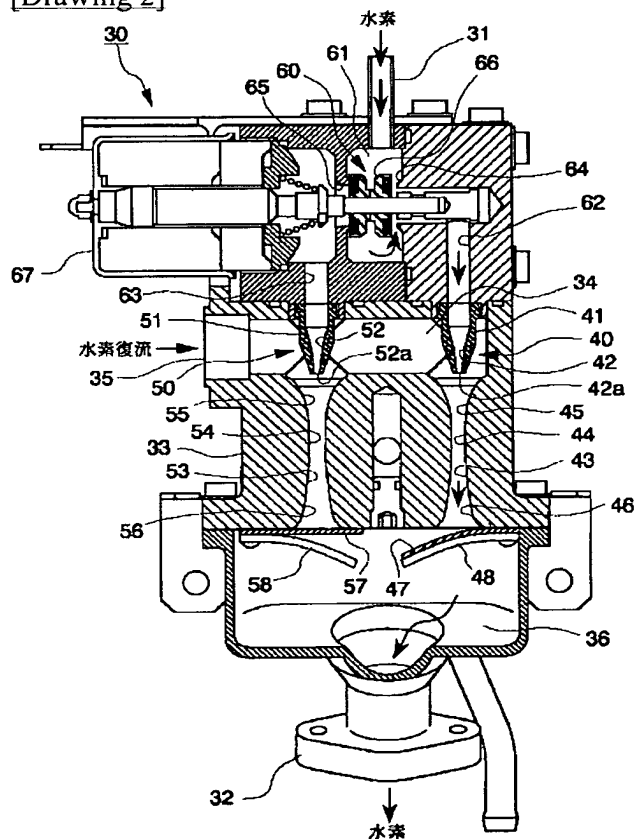
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

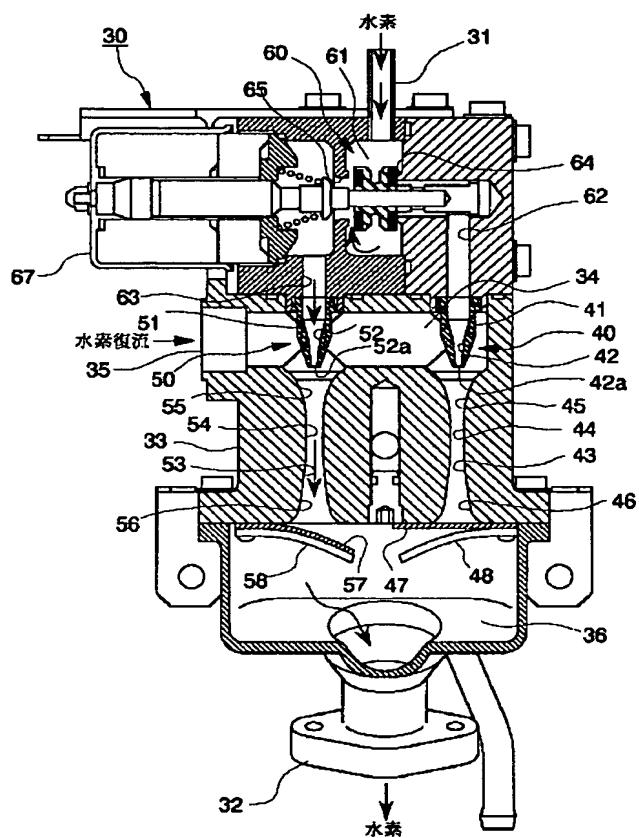
[Drawing 1]



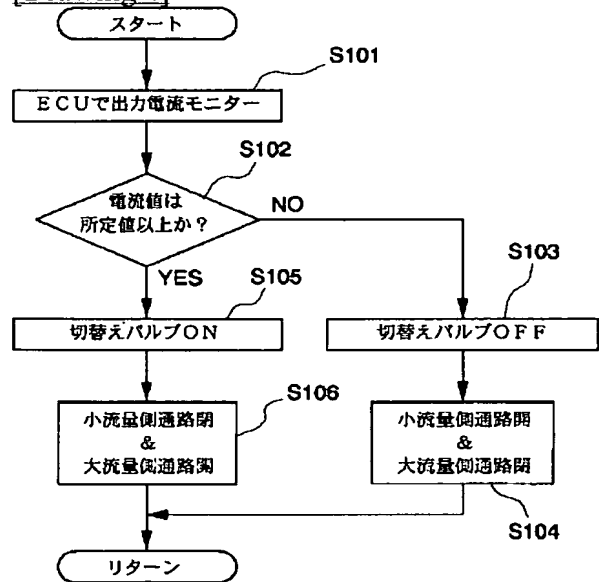
[Drawing 2]



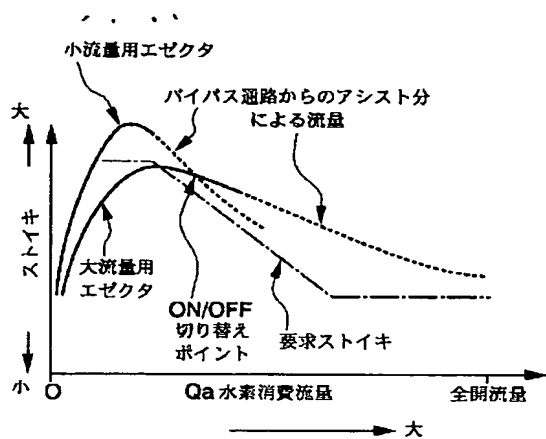
[Drawing 3]



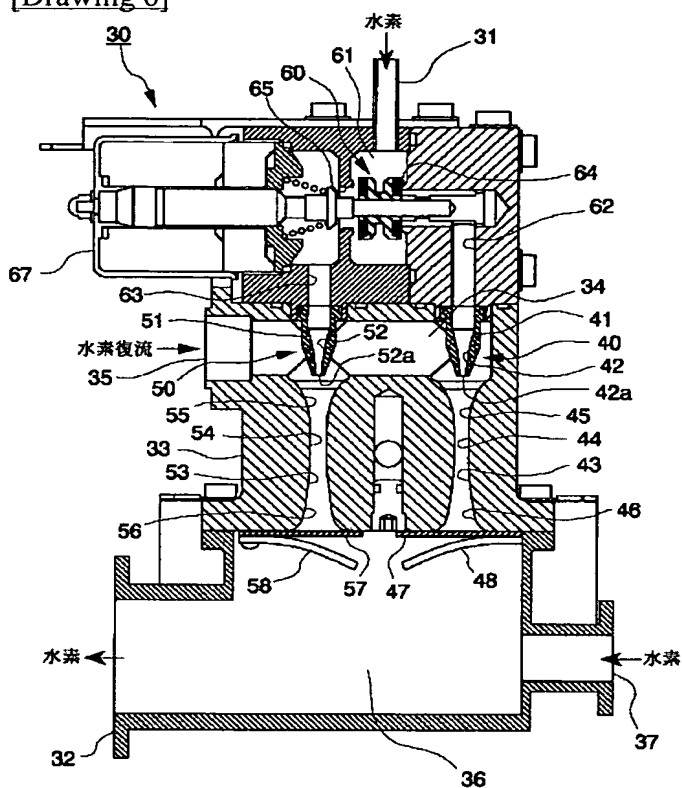
[Drawing 4]



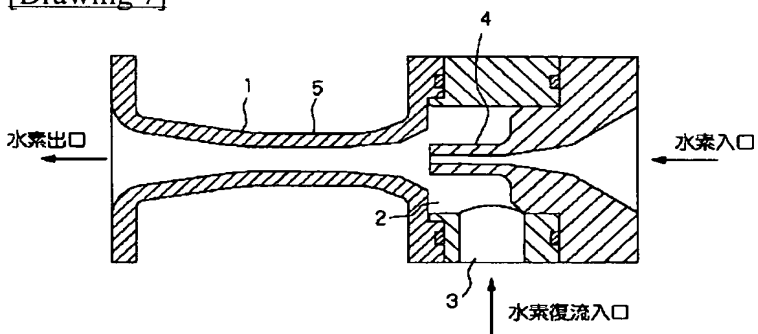
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Drawing 8]